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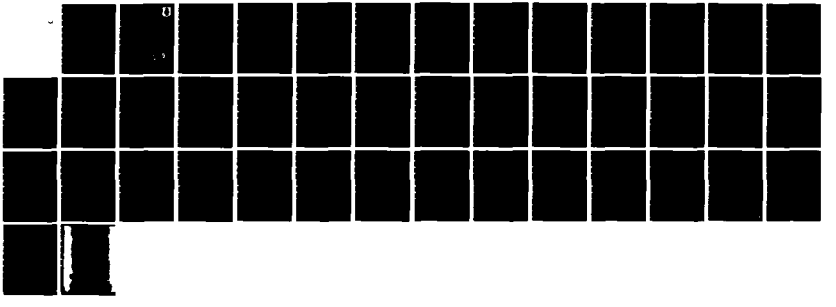

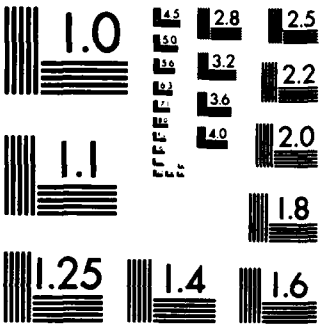

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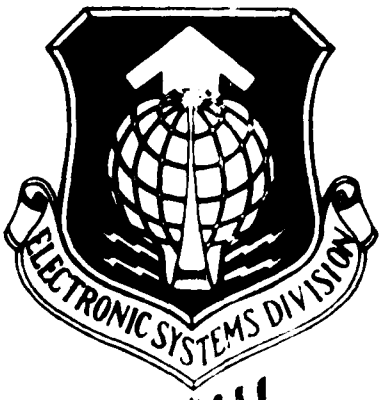

HANDBOOK FOR EVALUATION AND LIFE CYCLE PLANNING FOR SOFTWARE

Volume III: Reviews, Audits and CPCI Specifications

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AD-A142 716

1 February 1983

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Prepared for

ELECTRONIC SYSTEMS DIVISION
AIR FORCE SYSTEMS COMMAND
DEPUTY FOR ACQUISITION LOGISTICS
AND TECHNICAL OPERATIONS
HANSCOM AIR FORCE BASE, MASSACHUSETTS 01731

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This document is Volume III of the Handbook for Evaluation and Life Cycle Planning for Software (HELPS). This volume provides the user with comprehensive checklists and guides necessary to evaluate a contractor's software development efforts. These include: documentation, related specifications, support analysis, study reports, pertinent design issues, special requirements, interfacing, and other relevant action items. It lists the necessary preparation for each of the MIL-STD-1521A reviews and audits.

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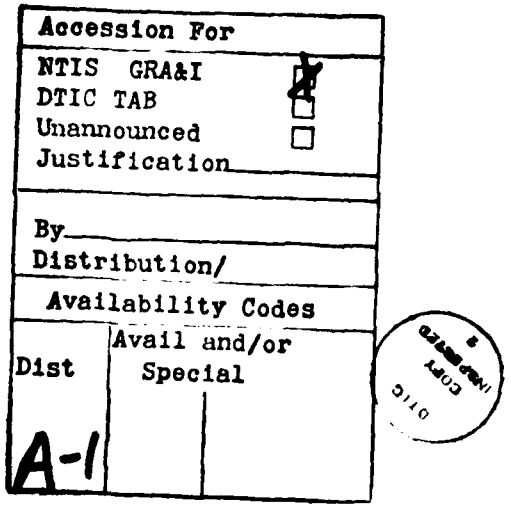
Cont. of Block 18:

SRR	SDR	PDR	CDR
PCA	FCA	FQR	CPDS
CPPS	TEST	REVIEWS	AUDITS
LANGUAGES	DATA	MANAGEMENT	CONFIGURATION
SQAP	MAINTENANCE	CPCI	REQUIREMENTS
PROGRAMMING	EXPANDABILITY	PERFORMANCE	GFE
INTERFACE	TIMING	SIZING	STORAGE
PACKAGING	SYSTEM	B-5 SPEC	C-5 SPEC

ACKNOWLEDGEMENTS

This book was developed to assist ESD computer resource personnel in the performance of their daily acquisition related activities. It contains a collection of available software related guidelines, checklists, and standard verbage associated with AF 800 series software and computer resources life cycle activities. The activities provided came from many different sources, e.g. guidebooks, Computer Resource Acquisition Management System (CRAMS), MITRE studies, information exchanges with other AFSC product divisions, and most importantly, from experienced software acquisition managers here at ESD.



HANDBOOK FOR EVALUATION AND LIFE CYCLE PLANNING FOR SOFTWARE

VOLUME III: REVIEWS, AUDITS, AND CPCI SPECIFICATIONS

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Section 1 - Technical Interchange Meetings (TIMs)

1-1. Review AFR 800-14, Vol II, Para 4-10 for compliance requirements.

1-2. Review items for discussion at TIM.

1-3. Review the following significant points for consideration:

A. Frequency of meetings

B. Representation at meetings

C. Actual vs Planning Progress

D. Possible misinterpretation of computer resource design or functional requirements

E. Actual vs Planned Expenditures and manpower alignments

F. Resolution of problems

1-4. Prepare and forward agenda to the contractors.

1-5. Meet with contractor to discuss software issues.*

1-6. Report software problems to program office.

1-7. Track and close out Government software Action Items generated at the TIMs.

NOTE: The contractor is to understand that the PO is not directing him to "get into the minutes".

Section 2 - System Requirements Review

2-1. Pre-Review Preparation

A. Review any system engineering trade-studies performed to support the allocations of system specification functions to CPCIs.

B. Review AFSCP 800-7, Para 5.3a.

C. Review MIL-STD-1521A, Appendix A.

D. Review ESD-TR-78-117, Software Acquisition Management Guidebook: Reviews and Audits, Section 3, Paras 3.1, 3.1.1, 3.1.2, 3.1.3.

E. Coordinate the SRR agenda (reference MIL-STD-1521A, Appendix A, Para 10.3).

1. Determine if the interfaces are understood and reflected.

2. Review initial definitions of CPCIs.

2-2. SRR Performance Requirements

A. Participate in SSR to evaluate the developer's progress and the direction of initial effort.

B. Insure requirement of representative items to be reviewed are presented during review. (MIL-STD-1521A, Appendix A)

2-3. Post-Review Requirements

A. Review SRR minutes.

B. Monitor/resolve action items pertinent to software.

C. Notify the contractor (MIL-STD-1521A, Para 4.2.4) that his review performance was approved, contingently approved or disapproved.

System Design Review

2-4. Pre-Review Preparation

A. Review AFSCP 800-7 (Chapter 5) & AFR 800-14, Vol II (Paragraph 4-9b).

B. Review MIL-STD-1521A, Appendix B.

C. Review MIL-STD-1521A, 4.1.3 and 4.2 to understand contractor and procuring activity requirements for supporting reviews and audits.

D. Review ESD-TR-77-254, Section 2 to establish the criteria used in defining CPCIs.

E. Review the CPDP and MIL-STD-483, Appendix XVII.

F. Review ESD-TR-78-117, Software Acquisition Management Guidebook: Reviews and Audits, Section 3, Paras 3.2, 3.2.1,. 3.2.2, 3.2.3.

G. Coordinate with procurement personnel regarding the treatment of competitive information for each program prior to conducting these reviews.

2-5. SDR Performance Requirements

A. Attend SDR to understand and review:

1. System requirements.

2. Allocation of functions to CPCIs.

3. Contractor's system design approach using personnel, schedules and high and low risk rates.

4. Interface requirements from CPCI to CPCI and CPCI to CI.

5. The computer program languages to be used.

B. Identify action items in areas where presentation is deficient.

2-6. Post-Review Activities

A. Review SDR minutes.

B. Monitor/resolve action items.

C. Inform the contractor of the adequacy of SDR by notification of either approval, contingent approval, or disapproval as per 4.2.4 of MIL-STD-1521A.

Section 3 - Preliminary Design Review

3-1. Pre-Review Preparation

A. Insure Review and Authentication of the B-5 specifications.

B. Review CPCI Test Plans.

C. Review Checklist for a Preliminary Design Review for a CPCI, Figure: III-3-1.

D. Insure that areas of particular Government interest are forwarded to the contractor enough in advance to allow in-depth preparation time.

E. Review PDR agenda (reference MIL-STD-1521A, Appendix C).

F. Review MIL-STD-1521A, Section 4, Para 4.2.4 and Appendix C to understand the options available to the PO at PDR with regards to approval, contingent approval, and disapproval.

3-2. PDR Performance Requirements

A. Participate in the PDR at the contractor facility.

B. Insure subsystem DT&E Test Plan is compatible with Section 4 of Development Spec.

C. Insure utility and support software requirements are defined and scheduled.

D. Insure contractor's plan for controlling changes to the design are established, understood, and followed.

E. Insure items which are marked N/A or TBD are explained and justified by contractor.

F. Identify action items where presentation/design is deficient.

3-3. Post-Review Requirements

A. Review PDR minutes.

B. Monitor/resolve action items.

C. Assure necessary ECP action is initiated for changes to established baseline as required.

D. Inform the contractor (MIL-STD-1521A, Para 4.2.4) that his review performance was approved, contingently approved, or disapproved.

FIGURE III-3-1 - CHECKLIST FOR A PRELIMINARY DESIGN REVIEW FOR A CPCI

The following list is based on the requirements of MIL-STD-1521 (USAF), particularly Appendix C. Specific instructions to the contractor (in the SOW or CDRL backup sheets) that modify, clarify or supplement the provisions of MIL-STD-1521A (USAF) may significantly alter the applicability of the following questions. Such instructions must be reflected correspondingly in the checklist. Three areas of consideration have been identified:

* Planning and preparation;
* Conducting the PDR; and
* Follow-up.

Planning and Preparation

- Should the review be a collective review of two or more CPCIs that are highly inter-related?
- Has the PDR been scheduled so as to allow sufficient time for meaningful analysis and design and for adequate preparation by contractor personnel?
- Will the development specification be available and approved prior to the PDR?
- Have the responsible (knowledgeable) procuring activity personnel (or qualified alternates) been designated? Have the appropriate personnel from other participating agencies (including contractors) been invited?
- Has the contractor been instructed to emphasize certain key topics, problem areas, risk areas (e.g., interfaces, man/machine interaction), alternate design approaches, trade-off study reports, performance estimates, simulation results?
- Has the contractor submitted an agenda in accordance with applicable standards (MIL-STD-1521) and specific instructions (the SOW)? Has an approved agenda been distributed?
- Are there action items from prior or related CI/CPCI reviews, previously identified design issues or provisional (e.g., "to be determined (TBD)") entries which should be addressed?
- Have the procuring activity personnel (and all others from the participating agencies) familiarized themselves with the subject documentation (development and preliminary product specification), related specifications, supporting analysis and study reports, pertinent design issues and relevant action items?
- Have they been cautioned about giving directions to the contractor during the PDR?
- Have the appropriate procuring activity personnel coordinated their views with respect to the relevant issues or action items?

- Is the procuring activity PDR co-chairman aware of his responsibility and authority in conducting the PDR?

Conducting the PDR

Opening considerations:

- Is everyone familiar with the agenda and indicated topics?

- Are the appropriate contractor personnel present (including the stenographer)?

- Have the joint and distinct responsibilities and authority of the procuring activity and contractor co-chairman been mutually agreed to, and understood by the attendees?

- Has the procuring activity co-chairman established the ground rules for introducing questions and discussion, limiting discussion, entering records into the minutes, establishing and staffing working groups, and setting suspense dates?

- Has the need for any side meetings (e.g., working groups) been previously identified? Have they been appropriately scheduled and staffed?

Closing considerations:

- Have all PDR agenda items been addressed?

- Have working group conclusions or recommendations been reported and recorded in the minutes?

- Have the previously identified action items, issues and TBDs in the specifications been adequately addressed?

- Have new action items been identified, recorded and responsible agencies assigned (including suspense dates, whenever feasible)?

- Have the proceedings been completely and accurately summarized? Have minutes of earlier sessions been reviewed and approved?

Follow-up

- Have minutes been prepared and submitted in accordance with the CDRL requirements?

- Are the minutes complete and accurate from the viewpoint of the procuring activity? Are all action items identified?

- Have approved minutes been distributed in accordance with the CDRL?

- Are all action items resolved or being resolved in accordance with their suspense dates (if assigned)?

- Have all the resulting action items, issues, conclusions and recommendations which are related to other (subsequent) reviews/audits been noted for action or consideration by the appropriate procuring activity personnel?

- Has the procuring activity determined the overall adequacy of the PDR, or the need to re-accomplish some (or all) of the PDR? Has the contractor been notified if needed?

Section 4 - Critical Design Review

4-1. Pre-Review Preparation.

A. Review MIL-STD-1521A, Appendix D for CDR compliance requirements.

B. Prepare for CDR by reviewing the draft C5 Specifications for those CPCIs pertinent to the CDR.

C. Review ESD-TR-75-85, Monitoring and Reporting Software Development Status, CDR, Pgs 26-30, to prepare for CDR.

D. Review ESD-TR-77-327, Software Maintenance, Critical Design Review, Section 2.2.2, Pgs 21-22, for full compliance requirements for maintainable software.

E. Review final CPCI Test Plans.

F. Review CDR agenda, send notice to contractor of major interest areas.

4-2. CDR Performance Requirements.

A. Insure contractor has all required data available for the design review. Check ESD-TR-77-263, Verification, (reference on Pg 28), for an essential data list.

B. During the CDR at the contractor facility, determine the following through detailed, analytical questioning:

1) Are all the requirements of the CPCI Development Specification being implemented?

2) Is the detailed design compatible with the design structure presented at the PDR?

3) Is the detail sufficient for coding?

C. Determine if the design is technically acceptable and inform contractor of decision.

4-3. Post-Review Requirements

A. Monitor/resolve action items.

Section 5 - Physical Configuration Audit

5.1. Pre-Audit Requirements

A. Review Appendix F of MIL-STD-1521A (USAF) for all compliance requirements.

B. Review ESD-TR-78-117, Reviews and Audits, Pgs 52-71, for formats and forms used in conducting a PCA.

C. Review ESD-TR-77-255, Software Quality Assurance, Para 2.4.1.4.2, Pgs 50-51 for all QA Requirements to be met.

D. Review MIL-STD-483, Paras 3.9.2 and 120.7 for PCA compliance requirements.

E. Establish an agenda for PCA and coordinate with contractor.

F. Ensure all review materials are available to the audit team. The list consists of:

1. CPCI Development (Part I) Specification
2. Final draft of CPCI Product (Part II) Specification
3. Version description document.
4. Manuscript copy of positional handbook
5. Manuscript of computer programming manual
6. Manuscript of computer program user's manual
7. FCA minutes
8. Configuration index
9. Configuration status report
10. CPCI development record
11. Proposed DD Form 250 (including shortage list)
12. List of changes made to CPCI made during qualification testing
13. Identification information: nomenclature, CPCI identifiers, specification identification number, code identification number (H 4-1 number)

NOTE: All of the above are found in ESD-TR-117, Pgs 38-39.

5.2. PCA Conduct

A. Participate in Physical Configuration Audits:

1. Review code listings found in the C-5 Specification to source code printouts used to assemble or compile the master tape.

2. Verify flowcharts found in the C-5 Specifications against the code listings.

3. Verify that the CPCI documentation satisfies its respective data item description requirements and that user documentation has been approved.

4. Verify that all ECPs have been incorporated on the appropriate documents and that accurate configuration status accounting records have been maintained.

5. Verify that all the problems and deficiencies identified in the design review and audit minutes are corrected.

6. Identify all CPCI shortages and make-up schedules on the appropriate DD Form 250.

5-3. Post-Audit Actions

A. Coordinate DD Form 250 with the Government Procuring Contracting Office.

B. Review PCA minutes and inform contractor of any post-audit action.

Section 6 - Functional Configuration Audit

6-1 Pre-Audit Preparation

A. Review AFR 65-3 for compliance requirements.

B. Review Appendix E of MIL-STD-1521A (USAF) for compliance requirements.

C. Insure necessary documents to be reviewed (ESD-TR-78-117, Reviews and Audits, Para 4.1.1, Pg 36) are available. They are:

1. CPCI Development Specification
2. CPCI Product Specification (final draft)
3. CPCI Test Plan
4. CPCI Test Procedures
5. CPCI Test Reports of all formal tests completed
6. PDR/CDR Minutes
7. CM Status Reports
8. List of Qualification Tests yet to be accomplished.

D. Review ESD-TR-78-117, Reviews and Audits pgs 43-50 for forms and formats used in conducting a FCA.

E. Review ESD-TR-77-255, Software Quality Assurance 2.4.1.4.2, pgs 50-51 for the QA requirements.

F. Review MIL-STD-483 3.9.1 and 120.6 for compliance requirements.

G. Establish an agenda for FCA and coordinate with the contractor.

6-2 FCA Conduct

A. Participate in Functional Configuration Audit at the contractor's facility. Determine deferred requirements yet to be qualified and schedule their verification during system DT&E.

B. Review the test documentation and analysis to ensure that the functional/performance requirements of the B-5 specification have been successfully qualified.

C. Determine functions that failed to qualify during PQT and FQT to assess impact on System DT&E, and authorize deviations/waivers as appropriate, to allow testing to proceed.

6-3 Post-Audit Actions

A. Monitor/resolve FCA actions items.

B. Review FCA minutes or report.

Section 7 - Formal Qualification Review

7-1. Pre-Review Preparation

A. Review MIL-STD-483, Para 3.9.4 and Para 120.8 for compliance requirements.

B. Establish an agenda for FQR (see MIL-STD-1521A, Appendix G) and coordinate with the contractor.

C. Ensure that all review materials are available to the audit team (including appropriate B-5 specifications, FCA and PCA minutes, system DT&E reports).

7-2. FQR Conduct

A. Review system DT&E results to verify that all deferred CPCI qualificaton testing has been successfully accomplished.

B. Update DD Form 250 for CPCI shortages (e.g., deviations and waivers) and coordinate with Principal Contracting Officer.

Section 8 - Computer Program Development Specification

8-1. Review MIL-STD-483 Appendix VI.

8-2. Review ESD-TR-78-139 An Air Force Guide to the Computer Program Development Specification.

8-3. Review MIL-STD-1679(NAVY), Weapon Systems Software Development.

8-4. Review the Computer Program Development Specification Checklist, Figure III-8-1.

8-5. Review B-5 Spec for technical adequacy, testability, traceability, internal/external interfaces, feasibility of computer program design factors, and the design requirements and constraints.

8-6. Insure Section 4 of the spec contains a verification cross reference matrix which indicates the method used to test each performance requirement stated in Section 3.

8-7. Insure B-5 requirements are traceable to the System or Segment Specification.

8-8. Consolidate comments from other agencies and forward to contractor.

8-9. Meet with contractor to resolve document deficiencies.

8-10. Review all changes to the document as a result of Government comments.

Figure III-8-1, COMPUTER PROGRAM DEVELOPMENT SPECIFICATION CHECKLIST

(CPCI Part I Specification IAW Notice 2 to MIL-STD-483)

This checklist is based primarily on the requirements of MIL-STD-483 (USAF), Appendix VI; and Data Item Description DI-E-3119B, Computer Program Development Specification. The reviewer of a computer program development specification must be aware of not only these standards but also any supplemental or contrary direction for the preparation of the development specifications supplied in the Statement of Work (SOW), in the Contract Data Requirements List (CDRL) or in CDRL backup sheets.

The checklist questions are numbered sequentially and are grouped according to the specification paragraphs to which they apply. Unless otherwise indicated, the parenthetical numbers following the questions refer to related paragraphs of MIL-STD-483 (USAF). Backup sheets have been provided at the end of this questionnaire for listing exceptions. Wherever there is a "no" answer, the exceptions should be listed with accompanying explanations on the backup sheets.

TITLE PAGE	Yes	No
(1) Is there a title page? (60.4)	( )	( )
(2) Does the title page conform to Figure 1? (60.4)	( )	( )
1. SCOPE		
1.1 Identification		
(3) Is there an approved identification, nomenclature and authorized abbreviation for the computer program? (60.4.1)	( )	( )
(4) Does the specification's identification paragraph begin with the prescribed opening phrase? (60.4.1)	( )	( )
1.2 Functional Summary		
(5) Is there a summary of the purpose of the specification? (60.4.1)	( )	( )
(6) Is there a brief description of the overall computer program by major functions? (60.4.1)	( )	( )
2. APPLICABLE DOCUMENTS		
(7) Are documents properly listed? (60.4.2)	( )	( )

3. REQUIREMENTS

3.1 Computer Program Definition	Yes	No
3.1.1 System Capacities		
(8) Have all capacity requirements been described? (60.5.3.1.1)	( )	( )
3.1.2 Interface Requirements		
(9) Have all equipment and computer programs which will interface with the CPCI been specified? (60.5.3.1.2)	( )	( )
(10) Have all of the physical characteristics of interfacing equipment that will influence the design of this CPCI been specified either directly or by reference to other specifications? (60.5.3.1.2)	( )	( )
(11) Will the CPCI be written in a compiler or assembly language that can be translated by a compiler or assembler that is part of this CPCI? (60.5.3.1.2)	( )	( )
(12) Has each compiler or assembler, if any, that will translate some or all of this CPCI's source language been specified as one of the CPCI's interfaces? (60.5.3.1.2)	( )	( )
3.1.2.1 Interface Block Diagram		
(13) Has an interface block diagram or an equivalent representation been included that shows the functional interrelationships between the CPCI and each of the other identified computer programs and equipment with which it will interface? (60.5.3.1.2.1)	( )	( )
(14) Does this interface representation adequately depict the CPCI's functional relationships with each computer program or equipment item with which the CPCI interfaces? (60.5.3.1.2.1)	( )	( )
3.1.2.2 Detailed Interface Definition		
(15) Have the functional relationships between the CPCI and each of the interfacing equipment items and computer programs been described? (60.5.3.1.2.2)	( )	( )
(16) Have the formats for the initiation, maintenance and termination of interaction with all interactive interfaces been specified? (60.5.3.1.2.2)	( )	( )
(17) Have the capacity requirements (e.g., the maximum overall data rates), for each interface been specified quantitatively? (60.5.3.1.2.2)	( )	( )

	Yes	No
(18) Have all other timing requirements imposed by all interfacing equipment or computer programs been specified? (60.5.3.1.2.2)	( )	( )
(19) Has the protocol for the initiation, maintenance and termination of interaction with all interactive interfaces been specified? (60.5.3.1.2.2)	( )	( )
(20) Have all other design constraints imposed by the interfacing equipment and computer programs on the design of the CPCI been identified? (60.5.3.1.2.2)	( )	( )
(21) For each of the CPCI's interfaces, are the functional descriptions adequate to support the design of the CPCI? (60.5.3.1.2.2)	( )	( )

3.2 Detailed Functional Requirements

(22) Have all operational functions (e.g., radar input processing, weapons direction, fragmentary order generation) to be performed by the CPCI been specified? (60.5.3.2)	( )	( )
(23) Have all special functions (such as control, test simulation, recovery) derived from the operational performance requirements and interface requirements been specified? (60.5.3.2)	( )	( )
(24) Is there a separately numbered and titled subparagraph (i.e., 3.2.1, 3.2.2, 3.2.3, etc.) for each of these CPCI's operational and special functions? (60.5.3.2)	( )	( )
(25) Is there a functional block diagram or equivalent graphical representation of the CPCI? (60.5.3.2)	( )	( )
(26) Does the functional block diagram or equivalent graphical representation adequately illustrate the functional operation of the CPCI? (60.5.3.2)	( )	( )
(27) Does the functional block diagram or equivalent graphical representation adequately illustrate the relationships between the CPCI's functions? (60.5.3.2)	( )	( )
(28) Does the functional block diagram or equivalent graphical representation adequately illustrate the relationships between the CPCI's functions and the things with which it must interface (e.g., the functions of the other identified systems, CPCIs, and interfacing equipment)? (60.5.3.2)	( )	( )

Yes No

3.2.X Function X. NOTE: Each function identified in basic paragraph 3.2 of the specification is further specified in a subparagraph numbered 3.2.X, where X ranges from 1 to the total number of functions, and "Function X" is replaced by the name of the corresponding function. All questions under 3.2.X should be answered for each of the CPCI's functions.

(29) Considering the content of higher-level, lower level, and related paragraphs, does the descriptive and introductory material provided in this paragraph adequately define the function and its relationships to other functions? (60.5.3.2.1) ( ) ( )

3.2.X.1 Inputs

(30) Indicate which of the following kinds of information have been specified for each input to the function. (60.5.3.2.1.1)

	Name or ID of Input 1 _____		Name of ID of Input 2 _____		Name or ID of Input 3# _____	
Input Information	Yes	No	Yes	No	Yes	No
Source(s)	( )	( )	( )	( )	( )	( )
Data Format	( )	( )	( )	( )	( )	( )
Units of Measure	( )	( )	( )	( )	( )	( )
Data Item Legal Value Ranges	( )	( )	( )	( )	( )	( )
Accuracy Requirements	( )	( )	( )	( )	( )	( )
Precision Requirements	( )	( )	( )	( )	( )	( )
Input to Volume	( )	( )	( )	( )	( )	( )
Input Frequency	( )	( )	( )	( )	( )	( )

(31) Are the actions to be taken in the event of erroneous input data specified explicitly either or an individual input basis, input category basis, or on some other broader basis? (60.5.3.2.1.1) ( ) ( )

(32) Are the diagnostic or error messages to be generated in the event of an error specified explicitly? (60.5.3.2.1.1) ( ) ( )

Repeat this table on backup sheets for any additional inputs.

	Yes	No
3.2.X.2 Processing		
(33) Has the intent of the function's operations been stated briefly? (60.5.3.2.1.2)	( )	( )
(34) Has each processing requirement of the function been specified such that the conditions under which the subfunctions are performed are identified, which specific mathematical or logical operations to be performed are identified, and the inputs to be processed and the outputs to be generated are identified? (60.5.3.2.1.2)	( )	( )
(35) Has an accurate textual or mathematical description of each processing requirement been included? (60.5.3.2.1.2)	( )	( )
(36) Have sequencing, timing, accuracy requirements and all other constraints upon the subfunction been specified? (60.5.3.2.1.2)	( )	( )

3.2.X.3 Outputs

(37) Indicate which of the following has been specified for each output generated by this function. (60.5.3.2.1.3)

	Name or ID of Output 1 _____		Name of ID of Output 2 _____		Name or ID of Output 3# _____	
Output Information	Yes	No	Yes	No	Yes	No
Data Content Specified	( )	( )	( )	( )	( )	( )
Conditions Specified	( )	( )	( )	( )	( )	( )
Destination Specified	( )	( )	( )	( )	( )	( )
Format Specified	( )	( )	( )	( )	( )	( )

	Yes	No
(38) Have the units of measure, accuracy/precision requirements, and frequency of output information been specified? (60.5.3.2.1.3)	( )	( )

	Name or ID of Output 1 _____		Name or ID of Output 2 _____		Name or ID of Output 3 _____		Name or ID of Output 4# _____	
Output	Yes	No	Yes	No	Yes	No	Yes	No
Units of Measure	( )	( )	( )	( )	( )	( )	( )	( )

Repeat this table on backup sheets for any additional outputs.

Output (cont.)	Yes	No	Yes	No	Yes	No	Yes	No
Precision Requirements	( )	( )	( )	( )	( )	( )	( )	( )

	Name or ID of Output 1 _____		Name or ID of Output 2 _____		Name or ID of Output 3 _____		Name or ID of Output 4# _____	
Output	Yes	No	Yes	No	Yes	No	Yes	No
Accuracy Requirements	( )	( )	( )	( )	( )	( )	( )	( )
Frequency	( )	( )	( )	( )	( )	( )	( )	( )

3.3.N Special Requirements. NOTE: The next sequential number following the number of the last function.

	Yes	No
(39) Have standards to be followed in the design and implementation of CPCI computer program components (CPCs) been specified? (60.5.3.2.2)	( )	( )
(40) Are the standards consistent with the higher level specification or other contractual requirements for the CPCI? (60.5.3.2.2)	( )	( )
(41) Are the standards appropriate to the environment and requirements of the CPCI? (60.5.3.2.2)	( )	( )
(42) Are the standards compatible and consistent with those that apply to all interfacing or otherwise related CPCIs? (60.5.3.2.2)	( )	( )
(43) Have requirements for the computer program's organization been specified? (60.5.3.2.2)	( )	( )
(44) If the CPCI is to process classified information, has adequate special attention been given to that information's protection? (60.5.3.2.2)	( )	( )
(45) Are all specific requirements for growth potential identified? For example, is the possible hardware expansion or augmentation for which the programs must be designed specified? (60.5.3.2.2)	( )	( )
(46) Has enough performance degradation due to program modification after initial development been allowed? (60.5.3.2.2)	( )	( )
(47) Have adequate special features to facilitate testing been specified? (60.5.3.2.2)	( )	( )

Repeat this table on backup sheets for any additional outputs.

	Yes	No
3.3.1 Programming Method(s)		
(48) Are programming standards or methods compatible among computer program components? (60.5.3.3.1)	( )	( )
3.3.2 Program Organization		
(49) Has special attention been given to the requirements for protecting classified information? (60.5.3.3.2)	( )	( )
3.3.3 Modification Consideration		
(50) Have program design modification requirements been specified? (60.5.3.3.3)	( )	( )
3.3.4 Special Features		
(51) Have any special features or procedures to facilitate testing of the CPCI been specified? (60.5.3.3.4)	( )	( )
3.3.5 Expandability		
(52) Has expandability of the CPCI been described? (60.5.3.3.5)	( )	( )
3.3.6 Special Timing		
(53) Has a description of special timing on priority requirements been included? (60.5.3.3.6)	( )	( )
3.4 Human Performance		
(54) Have all appropriate paragraph(s) of the system or system segment specification been cited which establish the human performance/human engineering requirements for all system equipment? (60.5.3.4)	( )	( )
(55) Have the human performance/human engineering requirements peculiar to this CPCI also been specified? (60.5.3.4)	( )	( )
(56) Have all inputs to the CPCI from a person and outputs from the CPCI to a person been identified? (60.5.3.4)	( )	( )
(57) For each such human input to the CPCI, has each of the following been reasonably specified, considering the CPCI's and the system's stated operational requirements? (60.5.3.4)	( )	( )

Human Output Specifications	Name or ID of Output 1 _____ Yes	No	Name or ID of Output 2 _____ Yes	No	Name or ID of Output 3 _____ Yes	No	Name or ID of Output 4# _____ Yes	No
Content	( )	( )	( )	( )	( )	( )	( )	( )

	Name or ID of Output 1 _____		Name or ID of Output 2 _____		Name or ID of Output 3 _____		Name or ID of Output 4# _____	
Name or ID of Each ## Possible CPCI Response	( )	( )	( )	( )	( )	( )	( )	( )
Conditions that Yield Each ## Response	( )	( )	( )	( )	( )	( )	( )	( )
Maximum CPCI Time for Each Response	( )	( )	( )	( )	( )	( )	( )	( )

	Yes	No
(58) For each CPCI output to a human, has each of the following been reasonable specified, considering the CPCIs and the system's stated operational requirements? (60.5.3.4)	( )	( )

CPCI Output Specifications	Name or ID of Output 1 _____ Yes	No	Name or ID of Output 2 _____ Yes	No	Name or ID of Output 3 _____ Yes	No	Name or ID of Output 4# _____ Yes	No
Content	( )	( )	( )	( )	( )	( )	( )	( )
Format	( )	( )	( )	( )	( )	( )	( )	( )
Maximum Information Density	( )	( )	( )	( )	( )	( )	( )	( )
Clarity (e.g., Contrast & Brightness)	( )	( )	( )	( )	( )	( )	( )	( )
Name or ID of Each ## Corresponding Input	( )	( )	( )	( )	( )	( )	( )	( )
Conditions That Yield Each## Input	( )	( )	( )	( )	( )	( )	( )	( )

Repeat this table on backup sheets for any additional outputs.

There may be more than one human input/response for any particular CPCI output.

	Yes	No
3.5 Data Base Requirements		
(59) Have all specified data elements been precisely defined? (60.5.3.5)	( )	( )
(60) Will data definitions be organized by the system data base in categories meaningful and appropriate to the given CPCI? (60.5.3.5)	( )	( )
(61) Do subparagraphs specify the source destinations and types of input and output information? (60.5.3.5)	( )	( )
(62) Have any required internal tables or parameters been specified? (60.5.3.5.3)	( )	( )
3.6 Adaptation		
(63) Have all the data items that are used by the CPCI and that vary from site to site been identified and specified? (60.5.3.6)	( )	( )
(64) Have all the system parameters that control various portions of the CPCI and that must be readily changeable been specified? (60.5.3.6)	( )	( )
(65) Have the CPCI's simultaneous capacity requirements (e.g., storage, subsystem timing rates, interfacing equipment capacities, and communication of data about the operational entities (e.g., total simultaneous displays and operator requests, number and types of inputs processed, etc.)) been specified quantitatively? (60.5.3.6)	( )	( )

	Name or ID of Output 1 _____		Name or ID of Output 2 _____		Name or ID of Output 3 _____		Name or ID of Output 4# _____	
	Yes	No	Yes	No	Yes	No	Yes	No
Name or ID of Each ## Appropriate Human Response	( )	( )	( )	( )	( )	( )	( )	( )
Maximum Time Allowed A Human to Respond	( )	( )	( )	( )	( )	( )	( )	( )

	Yes	No
3.7 Government-Furnished Property List		
(66) Have all Government-furnished computer programs, if any, that are to be included in the CPCI (including any compilers or assemblers) been identified by proper nomenclature, specification number, model number, if appropriate, and associated documentation? (60.5.3.7)	( )	( )

Repeat this table on backup sheets for any additional outputs.
There may be more than one human input/response for any particular CPCI output.

4. QUALITY ASSURANCE PROVISIONS

	Yes	No
(67) Are the provisions of this section consistent with the portions of the system specification that address software quality assurance?	( )	( )
(68) Is there a concise and unambiguous specification of the verification requirement and method(s) (i.e., inspection, review of analytical data, demonstration, and review of text data) to be applied against each functional and performance requirement of Section 3? (60.5.4 and 60.5.4.1)	( )	( )
(69) Is there sufficient guidance contained in this specification (or in referenced higher level specification paragraphs) for the preparation of test plans and procedures to insure that the CPCI is adequately and appropriately verified within reasonable cost and schedule constraints? (60.5.4.1)	( )	( )
(70) Are Development Test & Evaluation (DT&E) tests subdivided into following broad types: (A) Computer Programming Test and Evaluation (CPT&E); (b) Preliminary Qualification Tests (PQT); (c) Formal Qualification Tests (FQT)? (60.5.4.1)	( )	( )
(71) Do the tests compromising CPT&E satisfy one or both of the following criteria? (60.5.4.1)	( )	( )

	Name or ID of Output 1 _____		Name or ID of Output 2 _____		Name or ID of Output 3 _____		Name or ID of Output 4# _____	
Criteria	Yes	No	Yes	No	Yes	No	Yes	No
Only data source qualifying Section 3 Requirements	( )	( )	( )	( )	( )	( )	( )	( )
Accomplisned as part of integrated test program involving other systems, equipment, or computer programs?	( )	( )	( )	( )	( )	( )	( )	( )

(72) Are any applicable special handling requirements described? (60.5.5)	( )	( )

Repeat this table on backup sheets for any additional outputs.

Section 9 Computer Program Product Specification

9-1. Review draft C-5 Spec for technical adequacy and satisfaction of each requirement in the respective B-5 specification.

9-2. Review MIL-STD-483, Appendix VI, Computer Program Configuration Item Specification to insure the C-5 is in compliance.

9-3. Review ESD-TR-77-22, Life Cycle Events, Section A4, Computer Program Product Specifications, for compliance requirements.

9-4. Coordinate review of the document with other Government agencies involved.

9-5. Consolidate comments from other Government agencies and forward to the contractor.

9-6. Review all changes to the document as a result of Government comments.

9-7. Coordinate all changes with all agencies involved.

9-8. Review the Computer Program Product Specification Checklist, Figure III-9-1.

Figure III-9-1 COMPUTER PROGRAM PRODUCT SPECIFICATION CHECKLIST
(CPCI Part II Specification IAW Notice 2 to MIL-STD-483)

This checklist is not intended to be a substitute for thorough understanding of the overall system requirements and design approach. Familiarity with the corresponding development specification, related CPCI and CI specifications and higher specifications is considered a prerequisite for a meaningful review.

The following list is based on the requirements of MIL-STD-483 (USAF), Appendix VI. The reviewer must be aware of all applicable standards plus any supplemental direction supplied in the SOW or CDRL backup sheets. Such direction may be used to modify this checklist in a specific application. Section numbers prescribed in MIL-STD-483, Appendix VI, are shown in parentheses following the questions. An "X" in a section number indicates a section repeated for each CPC, so X is 1 for the first CPC, 2 for the second, etc.

	Yes	No
1. SCOPE		
(1) Does this section contain the appropriate lead sentence? (60.5.1)	( )	( )
2. APPLICABLE DOCUMENTS		
(2) Are all documents properly listed? (60.6.2)	( )	( )
3. REQUIREMENTS		
3.1 CPCI Structured Description		
(3) Does the specification identify the structure and functions of the CPCI consistent with the development specification (including approved changes)? (60.6.3.1)	( )	( )
(4) Does the design reflect the results or previous action items identified in earlier design reviews? (60.6.3.1)	( )	( )
(5) Does this section include a graphic portrayal (CPCI/CPC tree)? (60.6.3.1)	( )	( )
3.2 Functional Flow Diagrams/Charts		
(6) Is the general system flow of both data and control within the CPCI shown? (60.6.3.2)	( )	( )
(7) Are the operations performed by the CPCI graphically portrayed by a (series of) chart(s) which depict(s) the processing being performed?	( )	( )
(8) Does the CPC description and flowcharts provide appropriate level of detail for modifying and maintaining the source program (listing) consistent with the intended usage of the product specification and any specific contract requirements? (60.6.3.2)	( )	( )

	Yes	No
(9) Is a top level CPC flowchart provided that relates the processes being performed, the sequence of operating and decision points?	( )	( )
(10) Do the flowcharts reference each other properly? Are the flowcharts referenced to actual statement labels or tags in the listings (when available)? (60.6.3.2)	( )	( )
(11) Do flowcharts correspond to the task descriptions? (60.6.3.2)	( )	( )
(12) Is flowchart symbology in accordance with the current edition of Flowchart Symbols and Their Usage in Information Processing, ANSI X3.5-1970 or an approved standard? (60.6.3.2)	( )	( )
(13) Are CPCI modes of operation clearly distinguishable in both text and charts, (if applicable)? (60.6.3.2)	( )	( )
3.3 Interfaces		
(14) Is the essential as-built interface design between the CPCI and other operational computer programs and hardware described in detail? (60.6.3.3)	( )	( )
(15) Are all data units logically and quantitatively described? (60.6.3.3)	( )	( )
3.4 Program Interrupts		
(16) Does the program interrupt list describe each interrupt as to source, purpose, type, priority and required response of the executive control? (60.6.3.4)	( )	( )
(17) Are interrupt servicing components listed along with the probable rate of occurrence for each interrupt? (60.6.3.4)	( )	( )
3.5 Timing and Sequencing Description		
(18) Does a description of the control logic involved in referencing each CPC exist? (60.6.3.5)	( )	( )
(19) Are timing and sequencing of CPC operations relative to other CPCs described or pictorially depicted? (60.6.3.5)	( )	( )
(20) Are the (critical) execution timing estimates or measurements provided? Do they conform to the requirements of the Development Spec? (60.6.3.5)	( )	( )
(21) Is the method for computing spare time and the amount allocated as spare time described? (60.6.3.5)	( )	( )

	Yes	No
3.6 Special Control Features		
(22) Are the special control features outside of normal operational functions (such as initiation, restart, recovery, maintenance) identified and described?	( )	( )
3.7 Storage Allocation		
(23) Are CPCI storage requirements in relationship to total computer equipment storage capabilities graphically portrayed? (60.6.3.7)	( )	( )
3.7.1 Data Base Definition		
(24) Does a description of each file, table or item as to functional purpose, detailed definition of content and storage location exist for the CPCI data base? (60.6.3.7.1)	( )	( )
3.7.1.1 File Description		
(25) Has each file incorporated in the data base been described? (60.6.3.7.1.1)	( )	( )
3.7.1.2 Table Description		
(26) Has each table incorporated in the CP data base been described? (60.6.3.7.1.2)	( )	( )
3.7.1.3 Item Description		
(27) Are all items contained in the computer program data base described? (60.6.3.7.1.3)	( )	( )
3.7.1.4 Graphic Table Description		
(28) Does the description show all interrelationships between items, tables and files? (60.6.3.7.1.4)	( )	( )
(29) Is the table accomplished to the level of detail necessary to show required items? (60.6.3.7.1.4)	( )	( )
3.7.1.5 CPCI Constants		
(30) Are the actual data values for all constants defined? (60.6.3.7.1.5)	( )	( )
3.7.2 CPC Relationship		
(31) Is the relationship between the CPC and the data base given? (60.6.3.7.2)	( )	( )

	Yes	No
3.7.3 Data Base Location Requirements		
(32) Are storage location requirements described, if applicable? (60.6.3.7.3)	( )	( )
3.8 Object Code Creation		
(33) Are all object code generation requirements identified? (60.6.3.8)	( )	( )
3.9 Adaption Data		
(34) Is the adaption data specified for each unique site/configuration? Is it consistent with the System Allocation Document (if used)? (60.6.3.9)	( )	( )
3.10 Detail Design Description		
(35) Are individual CPCs described at the level of detail that define the design to permit CPC modification and adaption during operational use of the CPCI? Are they described with words and charts with necessary interreferences for clarity? (60.6.3.10)	( )	( )
(36) Does the lead paragraph follow the required format? (60.6.3.10)	( )	( )
3.10.X** Identification		
(37) Is each CPC identified by a name, tag and identification number? (60.6.3.10.1)	( )	( )
3.10.X.1 CPC No. X Description		
(38) Are conventions for symbol naming, register usage and coding described? (60.6.3.10.1.1)	( )	( )
(39) Are the CPC task descriptions consistent with the requirements of the development specification and allocation of functions to the CPC? (60.6.3.10.1.1)	( )	( )
(40) Is the hierarchy chart used to show any intrarelationships? (60.6.3.10.1.1)	( )	( )

**3.10.X.1 thru 3.10.X.6 is repeated for each CPC.

3.10.X.2 CPC No. X Charts

	Yes	No
(41) Do the flowcharts reference each other properly? Are the flowcharts referenced to actual statement labels or tags in the listings (when available)? Do the flow charts correspond to the task descriptions? (60.6.3.10.1.2)	( )	( )

3.10.X.3 CPC No. X Interfaces

(42) Are the interfaces to other CPCs reflected in the descriptions? Is the same terminology used? Are interfaces to the data base (external to the CPC) identified and described? Are those interfaces consistent with the data base description? (See Section 3.7.1).	( )	( )
(43) Are the interfaces to other CPCIs or CIs identified and described? Are the I/O formats and buffer definitions provided or correctly referenced? Do the external interfaces correspond to the related interfaces and descriptions on those other (CP) CI specifications? Do they reflect changes implemented on those other (CP) CI specifications?	( )	( )

3.10.X.4 CPC No. X Data Organization

(44) Are the symbols, constants, equivalences, data items and tables unique to the CPC described? (60.6.3.10.1.4)	( )	( )
(45) Is the usage of temporary (dynamic) storage areas described? (60.6.3.10.1.4)	( )	( )
(46) Are the relationships among the CPCI data items, tables and files defined? (60.6.3.10.1.4)	( )	( )
(47) Are the storage allocations (starting address and extent) of all data structures and CPCs of the CPCI specified? (60.6.3.10.1.4)	( )	( )
(48) Are the files (unique to the CPCI) described in terms of length, format/naming convention, organization, access method blocking, buffering? Are the tables similarly defined? Are the data items described in terms of number of bits, most significant bit, coding type, scaling factor, units, range of values, etc? (60.6.3.10.1.4)	( )	( )
(49) Is a set-use matrix (or equivalent) provided that details use of all data items, tables, files, constants, etc., by each CPC? (60.6.3.10.1.4)	( )	( )

	Yes	No
3.10.X.5 CPC No. Limitations		
(50) Are the limitations of the implementation described with respect to timing requirements, algorithms employed, I/O formats, I/O error checking and correcting and accuracy? (60.6.3.10.1.5)	( )	( )
3.10.X.6 CPC No. X Listing		
(51) Does the listing (when available) conform to the contractual requirements for source listing, compiler/assembler output, cross reference listing, etc.? Does the listing include the statement labels, tags and comments referenced in the flowcharts? Does the listing conform to the task descriptions and flowcharts? (10.6.3.10.1.6)	( )	( )
3.11 Program Listing Comments		
(52) Do program listings comments meet contractual requirements as to type, format and level of detail? (60.6.3.11)	( )	( )
4. QUALITY ASSURANCE		
(53) Are the associated CPCI test plan and procedures identified? (60.6.4)	( )	( )
4.1 Test Plan/Procedure Cross Reference Index		
(54) Are all the CPCI functions cross referenced to the applicable test plan and procedures? (60.6.4.1)	( )	( )
4.2 Other Quality Assurance Provisions		
(55) Are special test tools or other testing capabilities used in CPCI level testing identified? (60.6.4.2)	( )	( )
(56) Are quality assurance requirements, methods and procedures for preparation or duplication of the program (media) either specified or the applicable standards referenced? (60.6.4.2)	( )	( )
(57) If there is particular information important to the use of the specification or computer program in the future (e.g., integration testing), is it provided? (60.6.4.2)	( )	( )
5. PREPARATION FOR DELIVERY		
5.1 Preservation and Packaging		
(58) Are the requirements for packaging specified and consistent with anticipated handling and storage? (60.6.5.1)	( )	( )

	Yes	No
5.2 Markings		
(59) Are the identification markings detailed and consistent with the requirements? (60.6.5.2)	( )	( )
6. NOTES		
(60) Are the technical manuals necessary for proper CPCI operation and maintenance identified? (60.6.6)	( )	( )
(61) Is additional material not included elsewhere provided to support particular CPCs, such as alternative designs rejected, design rationale, references for algorithms used, suggestions for further modifications or expansion, results of key test that finalized the implementation? (60.6.6)	( )	( )
7. SECTION 10, APPENDIX(ES)		
(62) Is information as referenced from other sections provided in the Appendix? (60.6.7)	( )	( )

REFERENCES

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AFR 57-4	Modification Program Approval	15 Dec 77
AFSC Sup 1	Retrofit Configuration Changes	1 Apr 74
AFR 65-3	Configuration Management	11 Jul 74
AFSC Sup 1	Configuration Management	25 Jul 75
AFR 66-12	Aircraft and Missile Equipment Accountability	15 Aug 78
AFR 70-15	Source Selection Policies and Procedures	16 Apr 80
AFSC Sup 1	Source Selection Policies and Procedures	18 Feb 77
AFR 80-14	Test and Evaluation	12 Sep 80
AFSC Sup 1	Test and Evaluation	19 Feb 81
AFR 80-45	Distribution Statements on Technical Documents	26 Mar 71
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AFR 300-10	Computer Programming Languages	15 Dec 76
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AFR 310-1	Management of Contractor Data	30 Jun 69
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AFR 800-2	Acquisition Program Management	14 Nov 77
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AFR 800-8	Integrated Logistics Support Plan	7 Feb 80
AFR 800-14, Vol I	Management of Computer Resources in Systems	12 Sep 75
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AFSCP 800-3	A Guide for Program Management	9 Apr 76
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AFSC Design Handbook 4-2	Electronic Systems Test & Evaluation	10 Apr 71
MIL-HDBK-334	Evaluation of a Contractor's Software Quality Assurance Plan	15 Jul 81
MIL-STD-483 and Notice 2	Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs	31 Dec 70
MIL-STD-490	Specification Practices	30 Oct 68
MIL-STD-1521A	Technical Reviews & Audits for Systems, Equipment, and Computer Programs	1 Jun 76
MIL-STD-1679(NAVY)	Weapon System Software Development	1 Dec 78
MIL-S-52779A	Software Quality Assurance Program Requirements	1 Aug 79

ESD DOCUMENTS

ESD-TR-75-85	ADA016488	An Air Force Guide for Monitoring Software Development Status	Sep 1975
ESD-TR-76-159	ADA027051	An Air Force Guide to Software Documentation Requirements	Jun 1976
ESD-TR-77-16	ADA035924	Statement of Work Preparation	Jan 1977
ESD-TR-77-22	ADA037115	Life Cycle Events	Feb 1977
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